

IN THE CLAIMS:

Amendments to the Claims

Please amend claims 5 and 6 and add new claim 7 as shown below.

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (original) A magneto-resistive head comprising:
- a first and second magnetic shield films;
 - a spin bulb film formed between the first and the second shield films via an insulation film;
 - a soft-magnetic film arranged to be in contact with both end portions of a free layer of the spin bulb film;
 - a permanent magnet film arranged so as to be in contact with the lower portion of the soft-magnetic film and not in contact with the free layer of the spin bulb film; and
 - an electrode film for applying a signal detection current to the spin bulb film.
2. (original) The magneto-resistive head as claimed in Claim 1, wherein a distance between the end portion of the free layer of the spin bulb film and the end portion of the permanent magnet is not greater than 1.5 multiplied by a smaller distance among the distance between the permanent magnet film end portion and the first magnetic shield film and the distance between the permanent magnet film end portion and the second magnetic shield film.

3. (original) The magneto-resistive head as claimed in Claim 1, wherein the soft-magnetic film has a saturation magnetic flux density not smaller than 0.8 multiplied by a saturation magnetic flux density of the free layer of the spin bulb film.

4. (original) The magneto-resistive head as claimed in Claim 1, wherein a product of the saturation magnetic flux density of the soft-magnetic film multiplied by the film thickness is 1 to 10 multiplied by the product of the saturation magnetic flux density of the free layer of the spin bulb film multiplied by the film thickness.

5. (currently amended) A magneto-resistive head comprising:
a first and second magnetic shield films;
a spin bulb film formed between the first and the second shield films via an insulation film;
a soft-magnetic film arranged to be in contact with both end portions of a free layer of the spin bulb film;
~~a~~an anti-ferromagnetic film arranged so as to be in contact with the lower portion of the soft-magnetic film and not in contact with the free layer of the spin bulb film; and
an electrode film for applying a signal detection current to the spin bulb film.

6. (currently amended) A magneto-resistive head production method comprising steps of:
forming a first magnetic shield film ~~and a first insulating film~~;
forming a second magnetic shield film;
forming a spin bulb film ~~on the first~~ between the first and second shield films
via an insulation film;
~~forming a lift-off resist for patterning the spin bulb film~~;

~~patterning the spin bulb film by ion milling;~~

~~successively forming a permanent magnet film, a soft magnetic film, and an electrode film on the first insulating film, the spin bulb film, and the lift-off resist which have been patterned;~~

~~removing the lift-off resist and the permanent magnet film, the soft magnetic film, and the electrode film which are attached onto the lift-off resist; and~~

~~forming a second insulating film and a second magnetic shield film on the electrode film and the spin bulb film;~~

~~wherein an ion injection angle IM1 with respect to the substrate normal direction during the ion milling, an angle D1 as a film forming particle injection angle for forming the permanent magnet film with respect to the substrate normal, and an angle D2 as a film forming particle injection angle for forming the soft magnetic film with respect to the substrate normal are in relationships as follows: D1 is smaller than IM1, and IM1 is not greater than D2~~

forming a soft-magnetic film so as to be in contact with both end portions of a free layer of the spin bulb film;

forming one of a permanent magnetic film and an anti-ferromagnetic film so as to be in contact with a lower portion of the soft-magnetic film and not in contact with the free layer of the spin bulb film; and

forming an electrode film for applying a signal detection current to the spin bulb film.

7. (new) The magneto-resistive head production method as claimed in claim 6, wherein the insulation film is a first insulating film, the spin bulb film is formed on the first insulating film and the permanent magnetic film is formed, further comprising the steps of:

forming a lift-off resist for patterning the spin bulb film;

patterning the spin bulb film by ion milling;

successively forming the permanent magnet film, the soft-magnetic film, and the electrode film on the first insulating film, the spin bulb film and the lift-off resist which have been patterned;

removing the lift-off resist and the permanent magnet film, the soft-magnetic film, and the electrode film which are attached onto the lift-off resist; and

forming a second insulating film on the electrode film and the spin bulb film having the second magnetic shield film formed on the electrode film and the spin bulb film;

wherein an ion injection angle $IM1$ with respect to the substrate normal direction during the ion milling, an angle $D1$ as a film forming particle injection angle for forming the permanent magnet film with respect to the substrate normal, and an angle $D2$ as a film forming particle injection angle for forming the soft-magnetic film with respect to the substrate normal are in relationships as follows: $D1$ is smaller than $IM1$, and $IM1$ is not greater than $D2$.
